

What I Claim is:

1. An internal combustion engine comprising a closed cylinder, a piston reciprocating in said closed cylinder, said cylinder being of a predetermined length and having cylinder walls, said engine having a combustion chamber in each end of the closed cylinder, and at least one structural member continuously piercing one of the closed ends of the cylinder and attached to said piston to transfer work to and from the piston, said cylinder being substantially surrounded by and immediately adjacent to a circumferentially disposed exhaust gas volume, said exhaust volume being substantially equal to the length of the cylinder and being circumferentially surrounded by a substantial insulation such that a mean exhaust volume temperature will be close to a mean combustion chamber temperature, thereby reducing heat loss through the cylinder walls.

2. The engine of claim 1 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member.

3. The engine of claim 2 wherein said structural members are flexible and function in the tensile mode such that the crankshafts are moved by a pulling action.

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4. An internal combustion engine comprising a closed cylinder, a piston reciprocating in said closed cylinder, said engine having at least one torroidal combustion chamber and at least one structural member continuously piercing one of the closed ends of the cylinder and attached to said piston to transfer work to and from the piston, said cylinder being substantially surrounded by a circumferentially disposed exhaust gas volume.

5. An internal combustion engine comprising a fixedly mounted closed cylinder, a piston reciprocating in said closed cylinder, said engine having at least one torroidal combustion chamber and at least one structural member continuously piercing one of the closed ends of the cylinder and attached to said piston to transfer work to and from said piston, said cylinder having about its midpoint at least one circumferentially disposed gas passage aperture.

6. The engine of claim 5, wherein said aperture discharges gas from two combustion chambers which are substantially co-axial.

7. An internal combustion engine having a closed cylinder and a reciprocating member defining at least one torroidal combustion chamber within said cylinder, said member having an internal passage permitting the flow of gas into said chamber, said cylinder being substantially surrounded by a circumferentially disposed gas handling volume.

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8. An internal combustion engine comprising a closed cylinder, a piston reciprocating in said closed cylinder, said engine having at least one torroidal combustion chamber and at least one structural member continuously piercing one of the closed ends of the cylinder and attached to said piston to transfer work to and from the piston, said cylinder being substantially surrounded by a plurality of circumferentially disposed exhaust gas handling volumes.

9. The internal combustion engine of claim 7, wherein said gas includes exhaust gas and said cylinder is constructed of at least one pair of identical components arranged in a mirror image about the circumferential mid-point of said cylinder.

10. An internal combustion engine comprising a fixedly mounted closed cylinder containing a combustion chamber at each end separated by a reciprocating piston, two crank pins located on two crankshafts, two structural members linking said piston to each crankshaft and piercing each closed end of said cylinder, the distance between center point of said piston and the center point of each crank pin being variable during operation of said engine.

11. The internal combustion engine of claim 8, wherein said cylinder is substantially surrounded by two segregated circumferentially disposed volumes, each containing exhaust gases which during operation of said engine are at different ~~temperature and pressure.~~

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12. The internal combustion engine of claim 10, wherein said cylinder is constructed of at least one pair of identical components arranged in mirror image about at least one gas passage aperture in circumference of said cylinder.

13. An internal combustion engine comprising a fixedly mounted closed cylinder, a piston reciprocating therein to define two opposed combustion chambers adjacent each closed end of said cylinder, at least one structural member continuously piercing one of said closed ends and attached to said piston to transfer work to and from the piston, said cylinder having externally an at least partly circumferentially disposed exhaust gas volume approximately co-axial with said cylinder.

14. An internal combustion engine comprising a closed cylinder, a piston reciprocating therein to define at least one combustion chamber and a combustion volume between a piston face and a closed end of said cylinder, said cylinder having externally an at least part circumferentially disposed exhaust gas volume substantially radial of and axially defined within a variable dimension of said combustion volume.

15. An internal combustion engine comprising a closed cylinder, a piston reciprocating in said closed cylinder, said engine having at least one torroidal combustion chamber and at least one structural member continuously piercing one of the closed ends of the cylinder and attached to said piston to transfer work to and from the piston, said cylinder being substantially surrounded by a circumferentially disposed charge ~~gas volume.~~

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16. The engine of claim 15, wherein a housing is deployed circumferentially outside said volume, said cylinder during operation of said engine moving independently of said housing.

17. The engine of claim 4, wherein a housing is deployed circumferentially outside said volume, said cylinder during operation of said engine moving independently of said housing.

-- 18. The engine of claim 5, wherein said closed cylinder is fixedly mounted in relation to the reciprocating action of said piston, but is free to rotate. --

-- 19. The engine of claim 10, wherein said closed cylinder is fixedly mounted in relation to the reciprocating action of said piston, but is free to rotate. --

-- 20. The engine of claim 13, wherein said closed cylinder is fixedly mounted in relation to the reciprocating action of said piston, but is free to rotate. --

-- 21. An internal combustion engine having a closed cylinder and a reciprocating member defining at least one torroidal combustion chamber within said cylinder, said member having an internal passage permitting the flow of gas from said chamber, said cylinder being substantially surrounded by a circumferentially disposed gas handling volume. --

-- 22. An engine having a housing and a member reciprocally movable within said housing to define at least one torroidal working chamber, said member having a portion thereof occupying central space of said torroidal working chamber during at least part of working cycle of said engine, said portion of said member having at least one passage for the worked fluid of

said engine. --

-- 23. The engine of claim 22, wherein said portion has two separate passages for the worked fluid of said engine. --

-- 24. The engine of claim 4 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member. --

-- 25. The engine of claim 5 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member. --

-- 26. The engine of claim 13 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member. --

-- 27. The engine of claim 14 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member. --

-- 28. The engine of claim 14 including structural members attached to opposing sides of the piston and each continuously piercing one of the closed ends of the cylinder and a crankshaft positioned at either end of said cylinder and attached to a structural member. --